

DT04 Rec'd PCT/PTO 1 5 JUL 2004

AMENDMENTS TO THE CLAIMSPage 16, line 1 replace ~~CLAIMS~~ with WE CLAIM.⁶⁹
Claims 1 to ~~80~~ (canceled).

R126
⁷⁰
Claim ~~81~~ (new). A method of separating, from a mixture of objects, objects that exhibit a specific characteristic related color of the objects, which characteristic is not detectable by the naked eye or a color camera, comprising advancing said mixture, determining, using radiation, whether a portion of said mixture exhibits said characteristic and separating from the mixture the objects exhibiting said characteristic as desired portions of the mixture.

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Claim ~~82~~ (new). A method according to claim ~~81~~⁷⁰, wherein said determining comprises analyzing, in a plurality of narrow wavelength bands in the visible spectrum, such radiation varied by said portion.

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Claim ~~83~~ (new). A method according to claim ~~82~~⁷¹, in which said plurality is at least five.

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Claim ~~84~~ (new). A method according to claim ~~82~~⁷¹, in which each wavelength band is no more than 50 nanometers in width.

⁷¹
Claim ~~85~~ (new). A method according to claim ~~82~~⁷¹, and of determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

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Claim ~~86~~ (new). A method according to claim ~~82~~⁷¹, and additionally applying camera image interpretation to such varied radiation.

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Claim ~~87~~ (new). A method according to claim ~~82~~⁷¹, and additionally analyzing such varied radiation in the invisible wavelength spectrum.

Claim ~~88~~⁷⁷ (new). Apparatus comprising a device for producing advancement of a mixture of objects, a determining arrangement which uses radiation to determine whether a portion of the mixture is an object which exhibits a specific characteristic related to color of the object, which characteristic is not detectable by the naked eye or a color camera, and a separating device for separating from the mixture the objects exhibiting said characteristic as desired portions of the mixture.

Claim ~~89~~⁷⁸ (new). Apparatus according to claim ~~88~~⁷⁷, wherein said determining arrangement comprises a detecting arrangement serving to detect such radiation varied by said portion, and an analyzing arrangement serving to analyze the varied radiation in a plurality of narrow wavelength bands in the visible spectrum.

Claim ~~90~~⁷⁹ (new). Apparatus according to claim ~~89~~⁷⁸, in which said plurality is at least five.

Claim ~~91~~⁸⁰ (new). Apparatus according to claim ~~89~~⁷⁸, in which each 15 wavelength band is no more than 50 nanometers in width.

Claim ~~92~~⁸¹ (new). Apparatus according to claim ~~89~~⁷⁸, and for use in determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

Claim ~~93~~⁸² (new). Apparatus according to claim ~~89~~⁷⁸, wherein said detecting arrangement comprises light sensors provided with narrow band filters.

Claim ~~94~~⁸³ (new). Apparatus according to claim ~~89~~⁷⁸, wherein said detecting arrangement comprises a spectrum-generating, light-dispersive element, and light sensors distributed so as to be distributed along said spectrum when generated.

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Claim ~~95~~ (new). Apparatus according to claim ~~94~~, wherein said element is a grating or a prism. ⁷⁸

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Claim ~~96~~ (new). Apparatus according to claim ~~89~~, wherein said analyzing arrangement serves to analyze also such varied radiation in the invisible wavelength spectrum. ⁷⁸

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Claim ~~97~~ (new). Apparatus according to claim ~~88~~, and further comprising a color camera and a device arranged to receive the output from said camera and to perform camera image interpretation. ⁷⁷

⁸⁷
Claim ~~98~~ (new). A method comprising identifying CMYK-printed matter by irradiating the matter with radiation which is varied by the matter differently if the matter is CMYK-printed than if the matter is not CMYK-printed.

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Claim ~~99~~ (new). A method according to claim ~~98~~, wherein said determining includes analyzing, in a plurality of narrow wavelength bands in the visible spectrum, such varied radiation. ⁸⁷

⁸⁹
Claim ~~100~~ (new). A method according to claim ~~99~~, in which said plurality is at least five. ⁸⁸

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Claim ~~101~~ (new). A method according to claim ~~99~~, in which each wavelength band is no more than 50 nanometers in width. ⁸⁸

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Claim ~~102~~ (new). A method according to claim ~~99~~, wherein said bands 10 include a band in the region of 550 nanometers and a band in the region of 650 nanometers. ⁸⁸

⁹²
Claim ~~103~~ (new). Apparatus for use in identifying CMYK-printed matter, comprising a radiation-emitting arrangement serving to emit radiation which is varied by the matter differently if the matter is CMYK-printed than if the matter is not CMYK-printed, and a determining arrangement serving to determine whether the varied radiation corresponds to CMYK-printed matter.

⁹³
Claim ~~104~~ (new). Apparatus according to claim ~~103~~⁹², wherein said determining arrangement comprises a detecting arrangement serving to detect the varied radiation diffusely reflected from said matter, and an analyzing arrangement serving to analyze the diffusely reflected radiation in a plurality of narrow wavelength bands in the visible spectrum.

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Claim ~~105~~ (new). Apparatus according to claim ~~104~~⁹³, in which said plurality is at least five.

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Claim ~~106~~ (new). Apparatus according to claim ~~104~~⁹³, in which each wavelength band is no more than 50 nanometers in width.

⁹⁶
Claim ~~107~~ (new). Apparatus according to claim ~~104~~⁹³, and for use in determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

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Claim ~~108~~ (new). Apparatus according to claim ~~104~~⁹³, wherein said detecting arrangement comprises light sensors provided with narrow band filters.

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Claim ~~109~~ (new). Apparatus according to claim ~~104~~⁹³, wherein said detecting arrangement comprises a spectrum-generating, light-dispersive element, and light sensors distributed so as to be distributed along said spectrum when generated.

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Claim ~~110~~ (new). Apparatus according to claim ~~109~~⁹⁸, wherein said element is a grating or a prism.

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Claim ~~111~~ (new). A method of separating, from a mixture of objects, CMYK-printed objects from objects which are not CMYK-printed, comprising advancing said mixture, determining, using radiation, whether a portion of said mixture is a CMYK-printed object, and separating from the mixture the CMYK-printed objects as desired portions of the mixture.

Claim ¹⁰¹~~112~~ (new). A method according to claim ¹⁰⁰~~111~~, wherein said determining comprises analyzing, in a plurality of narrow wavelength bands in the visible spectrum, such radiation diffusely reflected from said portion.

Claim ¹⁰²~~113~~ (new). A method according to claim ¹⁰¹~~112~~, in which said plurality is at least five.

Claim ¹⁰³~~114~~ (new). A method according to claim ¹⁰¹~~112~~, in which each wavelength band is no more than 50 nanometers in width.

Claim ¹⁰⁴~~115~~ (new). A method according to claim ¹⁰¹~~112~~, and of determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

Claim ¹⁰⁵~~116~~ (new). Apparatus comprising a device for producing advancement of a mixture of CMYK-printed objects and objects which are not CMYK-printed, a determining arrangement which uses radiation to determine whether a portion of the mixture is a CMYK-printed object, and device for separating from the mixture the CMYK-printed objects as desired portions of the mixture.

Claim ¹⁰⁶~~117~~ (new). Apparatus according to claim ¹⁰⁵~~116~~, wherein said determining arrangement comprises a detecting arrangement serving to detect such radiation diffusely reflected from said portion, and an analyzing arrangement serving to analyze the diffusely reflected radiation in a plurality of narrow wavelength bands in the visible spectrum.

Claim ¹⁰⁷~~118~~ (new). Apparatus according to claim ¹⁰⁶~~117~~, in which said plurality is at least five.

Claim ¹⁰⁸~~119~~ (new). Apparatus according to claim ¹⁰⁶~~117~~, in which each wavelength band is no more than 50 nanometers in width.

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Claim ~~120~~ (new). Apparatus according to claim ¹⁰⁶~~117~~, and for use in determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

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Claim ~~121~~ (new). Apparatus according to claim ¹⁰⁶~~117~~, wherein said detecting arrangement comprises light sensors provided with narrow band filters.

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Claim ~~122~~ (new). Apparatus according to claim ¹⁰⁶~~117~~, wherein said detecting arrangement comprises a spectrum-generating, light-dispersive element, and light sensors distributed so as to be distributed along said spectrum when generated.

¹¹²
Claim ~~123~~ (new). Apparatus according to claim ¹¹¹~~122~~, wherein said element is a grating or a prism.

¹¹³
Claim ~~124~~ (new). A method of sorting a mixture of objects into respective fractions each having one or more characteristics common to the fraction, comprising determining the fraction to which any one object belongs by exposing the objects to radiation which is varied by the object and subjecting the varied radiation to camera image interpretation and to spectral analysis in the visible wavelength spectrum.

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Claim ~~125~~ (new). A method according to claim ¹¹³~~124~~, and further comprising subjecting such varied radiation to spectral analysis in the invisible wavelength spectrum.

¹¹⁵
Claim ~~126~~ (new). A method according to claim ¹¹³~~124~~, wherein said spectral analysis in the visible wavelength spectrum is in a plurality of narrow wavelength bands in the visible spectrum.

Claim ~~127~~¹¹⁶ (new). Apparatus for use in sorting a mixture of objects into respective fractions each having one or more characteristics common to the fraction, comprising a color camera, an arrangement which applies camera image interpretation to radiation which has been varied by the objects, and a spectral analyzer operable in the visible wavelength spectrum to analyze radiation which has been varied by the objects and is in the visible wavelength spectrum.

Claim ~~128~~¹¹⁷ (new). Apparatus according to claim ~~127~~¹¹⁶, and further comprising a spectral analyzer operable in the invisible wavelength spectrum to analyze radiation which has been varied by the objects and is in the invisible wavelength spectrum.

Claim ~~129~~¹¹⁸ (new). Apparatus according to claim ~~127~~¹¹⁶, wherein said spectral analyzer operable in the visible wavelength spectrum performs analysis in a plurality of narrow wavelength bands in the visible spectrum.

Claim ~~130~~¹¹⁹ (new). A method of sorting matter, including advancing the matter, and determining color and/or composition of the advancing matter by irradiating the matter with radiation which is varied by the matter, and analyzing the varied radiation in at least five narrow wavelength bands in the visible spectrum.

Claim ~~131~~¹²⁰ (new). A method according to claim ~~130~~¹¹⁹, in which each wavelength band is no more than 50 nanometers in width.

Claim ~~132~~¹²¹ (new). A method according to claim ~~130~~¹¹⁹, and of determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

Claim ~~133~~¹²² (new). A method according to claim ~~130~~¹¹⁹, and of determining color and/or composition characteristic(s) that are not detectable by the naked eye or by a color camera.

Claim ~~134~~¹²³ (new). A method according to claim ~~130~~¹¹⁹, and additionally applying camera image interpretation to such varied radiation.

Claim ~~135~~¹²⁴ (new). A method according to claim ~~134~~¹²³, wherein uncoated brown cellulosic material is identified and/or uncoated grey cellulosic material is identified.

Claim ~~136~~¹²⁵ (new). A method according to claim ~~134~~¹²³, wherein colored or tinted paper or board is identified.

Claim ~~137~~¹²⁶ (new). A method according to claim ~~130~~¹¹⁹, and additionally analyzing such varied radiation in the invisible wavelength spectrum.

Claim ~~138~~¹²⁷ (new). A method according to claim ~~137~~¹²⁶, and additionally applying camera image interpretation to such varied radiation, wherein coated brown cellulosic material is identified and/or coated grey cellulosic material is identified.

Claim ~~139~~¹²⁸ (new). A method according to claim ~~137~~¹²⁶, and additionally applying camera image interpretation to such varied radiation, wherein printed board is identified.

Claim ~~140~~¹²⁹ (new). Apparatus for use in sorting matter, including an advancing device for advancing the matter, a radiation-emitting device serving to emit radiation which is varied by the advancing matter, a detecting arrangement serving to detect the varied radiation, and an analyzing arrangement serving to analyze the varied radiation in at least five narrow wavelength bands in the visible spectrum in order to determine color and/or composition of the matter.

Claim ~~141~~¹³⁰ (new). Apparatus according to claim ~~140~~¹²⁹, in which each wavelength band is no more than 50 nanometers in width.

Claim ~~142~~¹³¹ (new). Apparatus according to claim ~~140~~¹²⁹, and for use in determining color of said matter and thereby whether said matter is or is not CMYK-printed matter, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

Claim ~~143~~¹³² (new). Apparatus according to claim ~~140~~¹²⁹, wherein said detecting arrangement comprises light sensors provided with narrow band filters.

Claim ~~144~~¹³³ (new). Apparatus according to claim ~~140~~¹²⁹, wherein said detecting arrangement comprises a spectrum-generating, light-dispersive element, and light sensors distributed so as to be distributed along said spectrum when generated.

Claim ~~145~~¹³⁴ (new). Apparatus according to claim ~~144~~¹³³, wherein said element is a grating or a prism.

Claim ~~146~~¹³⁵ (new). Apparatus according to claim ~~140~~¹²⁹, and further comprising a color camera and a device arranged to receive the output from said camera and to perform camera image interpretation.

Claim ~~147~~¹³⁶ (new). Apparatus according to claim ~~140~~¹²⁹, wherein said analyzing arrangement serves to analyze also such varied radiation in the invisible wavelength spectrum.

Claim ~~148~~¹³⁷ (new). A method of separating a de-inkable class of recyclable paper from unwanted material, comprising advancing a mixture comprised of said de-inkable class of recyclable paper and said unwanted material, determining, using radiation, whether a portion of said mixture is of said de-inkable class, and separating from the mixture the de-inkable class of recyclable paper as desired portions of the mixture.

Claim ~~149~~¹³⁸ (new). A method according to claim ~~148~~¹³⁷, wherein said determining comprises analyzing, in a plurality of narrow wavelength bands in the visible spectrum, such radiation diffusely reflected from said portion.

Claim ~~150~~¹³⁹ (new). A method according to claim ~~149~~¹³⁸, in which said plurality is at least five.

Claim ~~151~~¹⁴⁰ (new). A method according to claim ~~149~~¹³⁸, in which each wavelength band is no more than 50 nanometers in width.

Claim ~~152~~¹⁴¹ (new). A method according to claim ~~149~~¹³⁸, and of determining color of said portion and thereby whether said portion is or is not of said de-inkable class, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

Claim ~~153~~¹⁴² (new). Apparatus comprising a device for producing advancement of a mixture of a de-inkable class of recyclable paper and unwanted material, a determining arrangement which uses radiation to determine whether a portion of the mixture is of said de-inkable class, and a device for separating from the mixture the said de-inkable class of recyclable paper as desired portions of the mixture.

Claim ~~154~~¹⁴³ (new). Apparatus according to claim ~~153~~¹⁴², wherein said determining arrangement comprises a detecting arrangement serving to detect such radiation diffusely reflected from said portion, and an analyzing arrangement serving to analyze the diffusely reflected radiation in a plurality of narrow wavelength bands in the visible spectrum.

Claim ~~155~~¹⁴⁴ (new). Apparatus according to claim ~~154~~¹⁴³, in which said plurality is at least five.

Claim ~~156~~¹⁴⁵ (new). Apparatus according to claim ~~154~~¹⁴³, in which each wavelength band is no more than 50 nanometers in width.

Claim ~~157~~¹⁴⁶ (new). Apparatus according to claim ~~154~~¹⁴³, and for use in determining color of said portion and thereby whether said portion is or is not of

said de-inkable class, wherein said bands include a band in the region of 550 nanometers and a band in the region of 650 nanometers.

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Claim ~~158~~ (new). Apparatus according to claim ¹⁴³~~154~~, wherein said detecting arrangement comprises light sensors provided with narrow band filters.

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Claim ~~159~~ (new). Apparatus according to claim ¹⁴³~~154~~, wherein said detecting arrangement comprises a spectrum-generating, light-dispersive element, and light sensors distributed so as to be distributed along said spectrum when generated.

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Claim ~~160~~ (new). Apparatus according to claim ¹⁴⁸~~159~~, wherein said element is a grating or a prism.